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HUNGARIAN CHEMISTS VISIT SOVIET BLOC CHEMICAL INSTITUTIONS

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HUNGARY

VISIT TO SOVIET ORGANIC CHEMICAL INSTITUTES

[Following is a translation of an article by Tamas Szekely, of the Faculty of General and Inorganic Chemistry of the Eotovs Lorand University, Budapest, in the Hungarian-language periodical A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei (Bulletin of the Chemical Sciences Section of the Hungarian Academy of Sciences), Vol 19, No 2, Budapest, 1963, pages 277-278.]

The Institutes which I visited in the Soviet Union, and with which I had discussions about the cooperation for the next working period, are the following:

1. The hydrocarbon chemistry laboratory of the Institute of Organic Chemistry (Szerves Kemiai Intezetenek) of SzUTA [Szovjetunio Tudomanyos Akademiaja; Academy of Sciences USSR] (head: Professor (professzor) A.D. Petrov, Corresponding Member of the Academy (akad. lev. tag)).

2. The laboratories of the Institute of Organic Chemistry of SzUTA dealing with heterogeneous catalysis (heads: Kazanskii, Rubinstein, and Shuikin, Academicians (akademik usok)),

3. The laboratories and workshops of the Institute of Organic Chemistry of SzUTA engaged in manufacturing appliances and instruments,

4. The Elementoorganic Laboratory (Elementoorganikus laboratoriuma) of SzUTA (head: Professor K.A. Andrianov, Corresponding Member of the Academy),

5. The siliconorganic laboratory of the Petroleum Chemistry Synthesis Institute (Asvanyolajkemiai Szintezisek Intezetenek) of SzUTA (heads: A.V. Topchiev, Academician and N.S. Namiotkin, Corresponding Member of the Academy),

6. The division of metallorganics of the Synthesis of Organic Chemistry Institute (Szerves kemiai Szintezesek Intezetenek) of the Academy of Sciences of Latvia (Lett Sz Szk Tudomanyos Akademiaia) (head: M.G. Voronkov, Doctor of Chemistry (a kem. tud. doktora)).

Institutes 1-5 are in Moscow; Institute 6 operates in Riga.

In every institute there was an intention to widen their scientific cooperation with us and our suggestions in this line were received most warmly. In the course of my visit, during my conferences with the members of these institutes we found various new possibilities of widening our cooperation with each other.

On my tour I learned that in every institute research investigations are conducted in synthetics mostly, and thus they present an extremely multifarious and colourful picture as far as new compounds or series of compounds and new processes are concerned. The investigations of the Soviet institutes are somewhat limited in the fields of physical and structure chemistry. The reason for this is to be sought not in financial reasons, but rather in the interest and in the personal element of the research-team. Our silicone research in Hungary, on the other hand, is conducted exactly from physical and structural chemistry's point of view. Thus it was agreed unanimously in all the institutes I visited that there are wide-ranging possibilities for cooperation in the new directions of silicone chemistry--which, in the synthetic respect, are represented by the Soviet institutes--and that the basic principal for such a cooperation should be a division of work according to which our task would be to evaluate the obtained results from the structural and quantumchemical view, to examine them from the polymerphysical view, and to suppor them from physical chemistry's point of view.

The above outlined suggestion or wish for a division of work was, as a matter of fact, suggested primarily by those Soviet academic institutes whose collaborators had already become personally acquainted with our research and with our established measuring methods here.

In addition to accelerating both Soviet and Hungarian research work, this division of tasks would be favorable since we could take better advantage of the equipment and of the physical-chemistry research methods that we have already established or are going to establish in the near future. Since there are a great many common features between the institutions of the two countries as regards the principal conception of research in silicone chemistry, the suggested widening of cooperations would not interfere with the work, i.e. schedule, of our Institute. Our native silicone industry can expect very substantial help from the above-sketched cooperation because, apart from its interest from the point of view of general research, all the scheduled joint examinations are closely connected witheither the supply of silicone industry with moncmers, or with the realization of the manufacturing of new type silicone varnishes or silicone rubbers.

Up to now we have not had a contractual relation with

the Petroleum Chemistry Synthesis Institute of SzUTA. According to our discussions abroad there are strong possibilities for establishing scientific cooperation with them.

We concluded an agreement for mutual technical assistance with the laboratories mentioned under 3. As a first measure in this agreement we shall deliver to them components and joints for gas-chromatography during this current year. The Soviet Institute appears to be willing to reciprocate also within the field of gas-chromatography.

During the course of my visit to Riga it turned out that there are wide-ranging possibilities for cooperation with the Synthesis of Organic Chemistry Institute, built in 1926, of the Academy of Science of Latvia in the field of structural chemistry and measuring methods. We concluded a written agreement on the subject for this cooperation.

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VISIT TO CZECH CHEMICAL AND BIOLOGICAL INSTITUTES

[Following is a translation of an article by Mrs. Ferenc Tudos, of the Central Research Institute of Chemistry of the Hungarian Academy of Sciences, in the Hungarian-language periodical A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei (Bulletin of the Chemical Sciences Section of the Hungarian Academy of Sciences), Vol 19, No 2, Budapest, 1963, pages 283-285.]

I spent the first part of my study tour, conducted in September 1962, in Prague, at the Institute of Chemistry and Biology and at the Institute of Biology of the Czechoslovak Academy of Sciences (Czehszlovak Tudomanyos Akademia Kemiai es Biologiai Intezeteben, ill. Biologiai Intezeteben). I became more fully acquainted with the work of the Isotope Division of the Institute of Biology (Biologiai Intezet Izotopos Osztalyanak). This Division has come to be an independent organizational unit recently. Apart from sicentific research the scope of its duties includes work on assignment as well (to obtain and produce various compounds labelled by radioisotopes, to evaluate the isotope experiments of the Institute of Biology, etc.). Members of the Division have already given considerable assistance in the scientific training for isotope work. Thus during the last five or six years more than 150 workers acquired the knowledge necessary for working with isotopes. Since the Division has a two-level laboratory at its disposal, members of the other divisions of the Institute of Biology can also use this laboratory for their isotope experiments of higher radioactivity.

The division has seven scientific workers and eight technicians or laboratory technicians, and they work in three work groups: synthesis, analytical, and dosimetric groups.

The synthesis group is engaged in obtaining partly by biosynthetic means generally and specifically labelled amino acids, carbohydrates, and fatty acids. They produce compounds labelled ^{131}J, ^{35}S, ^{14}C, and T isotopes. Among many other things they worked out the method of obtaining labelled proteins, lipoids, amino acids, and sugars by a not specifically labelled biosynthetic method. Furthermore, they worked out a synthetic method for various specifically labelled amino acids (glycine, valine, alanine, and a-aminobutyric acid), as well as for galactose and glycose.

Members of the synthesis group did some examinations of the reaction mechanics as well in the course of their research work. Thus they observed, e.g., that in producing phenylserine (3-^{14}C) which has a lower specific activity than expected, starting with N-benzylideneglycine and benzaldehyde (^{14}C) a 'dilution' of the benzaldehyde (^{14}C) can be observed whixh is caused by inactive benzaldehyde formed on the decomposition of N-benzylidene glycine, and which, reacting with another N-benzylideneglycine molecule, reduces the specific activity of the end product.

Recently they have begun to examine in detail the methylating reaction of malonic acid-diethyl ester with $^{14}CH_3J$. By means of gas chromatography they showed that besides methyl malonic acid, also approximately 20% ethyl-malonic-acid-methyl-ethyl-ester was formed.

Apart from the usual analyses, the analytical group tries to develop more modern biosynthetic methods. Using *Chlorella vulgaris* alga they obtained not specifically labelled amino acids and other products. According to the abovementioned method the active matter infiltrates, in actual fact, quantitatively [See Note].

([Note]: They also worked out the gas chromatographic separation, or ionchanging resin separation of the obtained labelled products.)

Furthermore, they deal with radiolysis examinations as well, first of all with the carboxylation reaction of alyphatic carboxylic acids (a-aminobutyric acid, norvaline, norleucine, valine, leucine, isoleucine). They also succeeded in separating the reaction products. They conducted experiments on the carboxylization of alyphatic monocarboxylic acids, for obtaining suitable dicarboxylic acids. They did the experiments with $^{14}CO_2$. For a radiation source they used ^{60}Co. They also investigated the gas chromatographic separation of saturated and unsaturated fatty acids.

With the multifarious application of modern methods of analysis, i.e., with the appliaation of paper and gas chromatography, and with the analytic or preparative gas chromatography equipment they solve not only analytic problems, but they also lend great assistance to the synthesis group in working out actual problems of separation. The close cooperation between the two groups enables them to obtain, e.g., small quantities of matter of high specific activity.

The dosimetric group performs activity measurements for the Isotope Division as well as for other divisions of the Institute. They deal with measuring ^{14}C, ^{32}P, ^{45}Ca, ^{35}S, T and γ-radiatives. In a year they measure approximately 30,000 samples. The good work of the group is facilitated by modern equipment. Apart from glass-end-tube scalers, flow counters,

equipment measuring in gas phase, they also have scintillation equipment provided with a cooling system, which is suitable for a parallel definition of ^{14}C and T. For the estimation of paper chromatographic experiments, which are very frequent in the Institute, they have introduced an automatic estimation of radio-paper-chromatograms.

In the Chemical and Biological Institute of the Czechoslovak Academy of Sciences as well, I studied in greater detail the work of the isotope laboratory. The laboratory was built in 1961 and is of category two. It has a central task in the work of the Institute. Activity measurements are done here for the entire Institute with modern measuring equipment. The members of the group are interested in the perfecting of the techniques of measuring methods, i.e., in the elaboration of new methods.

They do not carry out independent preparatory work for obtaining labelled compounds. The basis of their reseach work consists of the examination of the mechanics of protein formation in the field of biochemistry.

Themes of the other divisions of the Institute embrace a wide field of chemistry: organic chemistry, physical chemistry, biochemistry, analytics. At the Division of Organic Chemistry (Szerves Kemiai Osztalyon) they deal with nucleinic acid and peptide chemistry, steroide and terpene chemistry, and with the examination of reaction mechanisms.

At Cluj I visited the Chemical Institute of the Slovak Academy of Sciences (Szlovak Tudomanyos Akademia Kemiai Intezetet). The Institute has four divisions: organic chemistry, physical chemistry, analytical chemistry, and pharmacodynamics. The Division of Organic Chemistry is engaged mostly in sugar chemistry, in obtaining mono-and polysaccharides by synthetic and biosynthetic methods, and in examining their various reactions. Research is being done in the field of the chemistry of alkaloids as well. The physiological effects of the above-mentioned compounds are investigated at the Pharmacodynamic Division of the Institute (Intezet Farmakodinamikai Osztalyan). Ultimate analyses are done at the Analytical Division of the Institute (Intezet Analitikai Osztalyan) for the other divisions as well. Apart from this they are interested in the decomposition reaction of various sugars.

During my visit the Institute was moved. From an oldfashioned building it was moved to an enormous, modern building in the 'green-belt' area on the outskirts of the town.

At the invitation of the Macromolecular Institute (Makromolekularis Intezet) I spent two days at Brno. I visited the isotope laboratory of the Institute. They are engaged in the examination of the mechanics and kinetics of polymerization employing isotopic methods. Mostly they use ^{35}S isotope.

I should like to emphasize the modern equipment of the institutes which I visited, the good organization of the work, the careful radiation protection, and the maximum use of the possibilities of cooperation between the various research groups.

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VISIT TO THE INSTITUTE OF PHYSICAL CHEMISTRY,

POLISH ACADEMY OF SCIENCES, WARSAW

[Following is a translation of an article by Frigyes Henszelmann, Chemical University of Veszprem, Department of Chemical Technology, in the Hungarian-language periodical A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyana Kozlemenyei (Bulletin of the Chemical Sciences Section of the Hungarian Academy of Sciences), Vol 19, No 3, Budapest, 1963, pages 363-369.]

During my trip in November 1961 (to Warsaw, Poznan, Wroclaw, Gliwice, Cracow) I had an opportunity to visit the seven research groups of the Institute of Physical Chemistry (Fizikai Kemiai Intezetenek) of the LTA [Lengyel Tudomanyos Akademia; Polish Academy of Sciences] located in departments of various universities, as well as four industrial research institutes and 12 departments of technical and scientific universities.

Only one institute of the LTA is doing chemical research, the Institute of Physical Chemistry ([Polish]: Instytut Chemii Fizicznej Polskiej Akademii Nauk, Ul Pasteura 3, Warszawa). Director (igazagatoja) of the Institute is Professor Dr. Michal Smialowski, Academician; its scientific director is Professor Stanislaw Bretsznajder, Academician (akademikus). The head office and laboratories of the Institute are under construction and are expected to be finished in about two years. At present, the Institute consists of a number of research groups, dispersed and working at various locations in departments of the several universities of the country.

The Institute has four sections devoted to the following activities: 1. physico-chemical problems of chemical technology; 2. investigation of surface phenomena; 3. structure research, and 4. investigation of electrode reactions.

I had an opportunity to visit the laboratories and see the research work going on in sections 1. and 3., and to some extent, in section 2.

I have spent the longest time with the section engaged in physico-chemical problems of technology in order to become acquainted with their work. Head of this section is Professor S. Bretsznajder, who at the same time is faculty head (vezetoje) of the Department of Technology Planning (Technologiai Tervezesi Tanszekenek) of the Technical University of Warsaw (Varsoi Muszaki Egyetem).

The themes of the scientific work carried on in this Institute are closely connected to the physico-chemical principles of the procedures in the chemical industry and to the research work relative to the technological operations. One of their main problems is to find possibilities for intensifying certain procedures of material and heat exchange. These are:

Intensified material exchange by pulsated liquid in the solution of solids and in gas absorption

Intensified material and heat exchange between gases and vibrated solids by means of the vibration technique. The effect of the resistance of the vibrated layer on the flow or gas.

Investigation of the effective heat conductance of solid granulous catalysts in the event of gases permeating the layer.

Rapid experimental method for the determination of the coefficient of local heat and material exchange in complex industrial equipments. For this purpose absorption measurements are made in models to determine the darkening caused by ammonia on the copper sulfate treated chromatographic paper. This is done by the photometric method based on the principle of similarity developed by Bretsznajder and associates. For the determination of the Reynolds number, for instance, they have investigated the effect of the flow of ammoniac gas on heat-sensitive paper which had been sensitized by a diazo compound and placed in the model apparatus. In the event of laminar flow, relationships were found between the extent of darkening and the Reynolds number.

The research work carried on in the Department of Technology Planning clusters around three main objectives.

The first one is the development and planning of new technological procedures for processing certain domestic raw materials. There are especially two such raw materials whose processing technology determines the subject of research. One is the processing of sulfur ore by extraction, the other, the production of aluminum silicate from clay. These technologies were developed not only for laboratory procedures but also for employment in pilot plants. The selection and investigation of the pertinent fundamental operations is the objective of the following research activities:

a) Heat Exchange.

Heat exchange in exothermic reaction on condensation or the reagent, or heat exchange in distillation by submersion burner.

b) Material Exchange and Material Separation.

Leaching and filtering in the production of aluminum compounds and in the extraction of Polish sulfur ores. Absorption of sulfur compounds from industrial gases.

The second objective of research is the investigation of the physical chemistry of the principles of calcination, especially studies of the thermic dissociation of the crystalline phase (thermogravimetric investigations) and studies of the formation mechanism of solid nuclei in the course of thermal dissociation.

The third group of research work deals with theoretical and experimental investigations concerning the conversion of experimental data into units of technical measurements in chemical reactions involving environmental heat exchange.

In compliance with my schedule I have studied more intensively the absorption and homogenous catalytic oxidation of gases containing sulfur dioxide, and the information received was very valuable, indeed. For several years this question, which is in connection with the production of alumina from aluminum sulfate, has been intensively studied both from a theoretical and a technological angle. Especially the homogenous catalytic effect of iron(II) salts and the assumed microheterogenous catalytic effect of the developing basic iron (III) sulfate upon the oxidation of waste gases of small sulfurdioxide concentration have been investigated in comparison with manganese salts. These experiments have shown a better than 70% efficiency in the transformation of sulfur dioxide into sulfuric acid of 15% to 25% concentration. Based on their results, a pilot plant has been built in order to support this fact by large-scale operations.

Besides the Research Institute of Physical Chemistry (Fizikai Kemiai Kotato Intezetenek) of the LTA with its staff of 19 (of these, 12-13 are research workers), which is attached to the Department of Technology Planning, there is another group of three or four research workers from the Research Institute of General Chemistry (Altalanos Kemiai Kutato Intezet) who work under the direction of Professor Bretsznajder. Counting the instructors and scientific workers of the department, there are about 25 to 30 graduates engaged in solving the problems mentioned.

Some research workers belonging to the section investigating the physico-chemical problems of chemical technology are in the Department of Inorganic Technology (Szervetlen Technologiai Tanszeken) of the Technical University of Warsaw (head of the department (tanszekvezeto) is Professor Dr. Stefan Weychert). Their field of research is the exploration of the oxidation of sulfur dioxide in the presence of vanadium pentoxide as catalyst, and especially, the determination of external and internal diffusion. Their work includes further thermogravimetric and roentgenographic investigations of the mechanism of carbon monoxide conversion.

A group of five research workers of the Department of

Inorganic Technology of the Technical University of Warsaw belongs also to the section of technological research. (Head of the department is Prof. Dr. Wlodzimierz Bobrownicki, corresponding member of the Polish Academy of Sciences (LTA levelezo tagja).) Research investigations of thermophosphates represent one of their main objectives. By using thermic, microscopic, roentgenographic and chemical methods they have studied in every detail the conditions and the mechanism of magnesium silicate and magnesium sulfate reactions with apatites. It has been found that the phosphorus content becomes most easily absorbable for plants when amorphous thermophosphate is being formed. Investigations are further made to explore the reaction of apatites with metaphosphates and the kinetics of the carbon reduction of phosphates.

Extensive investigations have been made to determine the azotizing [nitrogen fixation] rate of calcium carbide in the presence of various additives (such as, dolomite, iron salts, calcium fluoride, calcium chloride). For these measurings the thermogravimetric method was used, together with an electromagnetic scale of their own construction. Interesting experiments are being prepared for the enrichment of potassium chloride by means of electrostatic methods.

The section of the Institute of Physical Chemistry of the LTA engaged in structure research is also located at the Department of Inorganic Chemistry of the Technical University of Warsaw. (Head (vezetoje) of the department and of the section is Professor Dr. Wlodzimierz Trzebiatowski, Academician.) The Institute and the Department maintain close cooperation and their equipment is excellent. They have several x-ray apparatuses for structure analysis, electron microscopes, thermal balances, cobalt radiation sources, several large furnaces for exceptionally high temperatures, an infrared spectrograph, chromatograph, etc.

The field of their rather extensive research work is the chemistry of solids. They study the mostly high temperature synthesis of metal-metal, metal-hydrogen, metal oxide-metal oxide systems and their crystal structures. In their work extensive use is made of magnetochemical methods, especially for the investigation of uranium, hydride of uranium, deuteride of uranium, tellurides of uranium and oxitellurides. Besides the uranium compounds, they have studied the magnetic susceptibility and electric conductance of various hydrides (Ti-H, Nb-H, Ta-H, La-H, Zr-H) and their crystal structures by means of x-rays. The same methods were used in the investigations of platinum, palladium, and nickel catalysts with γ-Al_2O_3.

In the investigation of alloys, greatest attention was given the rhenium alloys. The structures of the alloys in

the systems Re-Pt, Re-Au, Re-Th, were explored by x-ray examinations. Besides the thermodynamic properties and structural characteristics of the Zn-Au, Zn-Ag alloys, they have crystal structure of ZrAs and $ZrAs_2$. In exploring the Cd-As system, the method of zonal melting was applied in order to obtain maximum purity.

Their 300-Curie cobalt source is used to measure the changes due to prolonged irradiation of potassium dichromate and the variations in the reduction potentials of various solutions.

A Plasmajet furnace with a maximum temperature of 15,000° C is used for measuring the dissociation heat of minerals (e.g., zircon.)

Recently they have taken up the polarographic examination of melts.

In the course of studying the metal-oxide-metal-oxide systems, their first objectives were the production of titanates of barium, investigation of their crystal structure and electric conductance; similar investigations were made of the titanates of strontium and beryllium. Calculations were made to determine the thermodynamic reaction between anhydrite and quartz, and then the mechanism of this reaction and its kinetics was investigated at various temperatures. From the oxide systems studied, mention must be made of the phosphates, especially of the $MgO-P_2O_5$ and the $CaO-P_2O_5-SiO_2$ systems. The latter one has been investigated especially in connection with the production of defluorized thermophosphates.

They have studied the trace elements in domestic raw minerals, primarily in raw phosphates and in calcium cyanamide.

Of the section of the Institute of Physical Chemistry of the LTA which is engaged in studying surface phenomena, I have visited the two groups working in Cracow. One group located in the Department of Physical Chemistry (Fizikai Kemiai Tanszeken) of the "Jagello" University of Sciences (Jagello Tudomanyegyetern) (Department and section head: Prof. Dr. Bohdan Kamienski). This group has studied for a long time and on a very extensive scale the electric phenomena on contact surfaces between gases (air) and liquids in the presence of various additives (so far, some 300 different measurings have been made). The other group works in the Department of Inorganic Chemistry (Szervetlen Kemiai Tanszeken) of the Academy of Mining and Metallurgy (Banyaszati es Kohaszati Akademia) (Head: Prof. Dr. Adam Bielanski). Their field is the chemistry of solid bodies. Studied are the variations in the physical and electric characteristics of NiO and ZnO catalysts during operation, the reaction kinetics and mechanism of the

dehydration and hydration of calcium phosphate, and the modifications of dicalcium silicate on beryllium fluorborate models.

Besides these groups of the Institute of Physical Chemistry of the LTA operating in various university departments, I also visited several departments of universities. The first to be mentioned was the Department of Inorganic Chemistry of the University of Poznan (Poznani Tudomanyegyetem). Head of the department is Prof. Dr. Alfonz Krause, who for the past four decades has been engaged in the investigation of the production, structure, and catalytic effect of inorganic hydroxides and oxyhydrates and of the mechanism of other catalytic processes.

At the technical universities of Warsaw, Wroclaw, and Gliwice I have also studied the work of the departments of chemical operations. The most detailed study of such departmental work was made possible at the Warsaw university. There, the head of the department, Prof. Dr. Janusz Ciborowski and his associates are studying the phenomena occurring between gases and solid particles of fine dispersion. These are problems chiefly of dynamics, such as heat and material exchange in liquefied layers and the employment of fluidization for the drying and roasting of ores. Special attention is devoted to the condensation of sublimates.

One of their most important fields of activity is the study of kinetics and thermodynamics of fluidized drying, which have been studied very intensively. They have determined the influence of parameters on the coefficients of material and heat exchange and are exploring some question of the dynamics of fluidization (such as drying of fine powdered substances, the role of granulometric distribution, the abrasion of the granules, the effect of the resulting electrostatic phenomena).

Of special interest were their experiments with the evaporation and simultaneous crystallization and dehydration of solutions. The fluid is fed into a bed of ceramic material or sand. They have found that the intensity of feeding will inhibit fluidization and they have developed a method to calculate the intensity.

The graphic method developed for the determination of the maximum thermodynamic condensation efficiency of sublimates has been applied to naphtalene condensation by reversible adiabatic expansion.

The theoretical aspects of humidifying and drying of gases in fluidized layers have also been investigated. Their laboratory and pilot plant experiments included some practical problems as well. They have developed, among other, methods for the fluidized drying of ammonium nitrate and corn, and

methods for the reduction of sodium sulfate. Recently, a method has been worked out for the extraction of sulfur from sulfur ore by means of calcination and sublimation.

The Department of Chemical Operations (Vegyipari Muveletek Tanszeken) in Wroclaw (Department head: Prof. Zdzislaw Ziolkowski) is chiefly engaged in studies of the problems of extraction (pulsation) and in the development of distillation and absorption procedures and their measuring.

In Gliwice, a section of chemical operations and machine construction of the Department of Technical Sciences (Muszaki Tudomanyok Osztalyanak) of the LTA is working at the university Department of Chemical Operations. (Head of both institutions is Prof. Dr. Tadeusz Hobler.) Some members of the above-mentioned two university departments of chemical industrial operations are also associated with this research team. Their main field is research in heat exchange, but they are also studying problems of hydraulics, distillation, and pulsation.

In Gliwice I have also visited the Department of Inorganic Chemical Technologies (Szervetlen Vegy'pari Technologiak Tanszeket). (Head of the Department is Professor Dr. Stefan Pawlikowski.)

Gliwice itself is in the center of the chemical industry of Silesia, it is not surprising therefore that, in the immediate neighborhood of the great nitrogen and sulfur plants and a chemical refinery, the research work at the university extends to the following fields:

a) Technology of nitrogen compounds. New methods have been developed for the production of ammonium nitrate, ammonium carbonate and hydrazine, and the hygroscopic content and adhesion of ammonium nitrate fertilizers and the employment of slags in fertilizer production have been studied. Their investigations concerning reaction kinetics include the decomposition of nitrogen oxide in an electric field.

b) Sulfur research. Investigations were made regarding the absorption of sulfur dioxide in ammonium sulfate solutions, the vaporization and oxidation kinetics of sulfur, and experiments were made with burning or sublimating, of flotation-enriched sulfur ore in an air current.

c) Corrosion. Besides the production of acid-fast mortars and cements from domestic raw materials, they have studied the protection of steel against soil corrosion and the protection of structural materials used in the chemical industry.

d) Production of inorganic compounds. The production of aluminum salts from domestic clays and the technology of some fluorine compounds have been studied and a method developed to produce phosphorus pentoxide and iodine pentoxide

of high purity.

Besides the university departments, I have also visited four industrial research institutes.

The Institute of General Chemistry (Altalanos Kemiai Intezet) in Warsaw (/Polish/: Instytut Chemii Ogolnej; Director: Prof. Aleksander Zmaczynski), with a staff of about 400, is engaged in the study of many problems. There are special sections for analytics, physical chemistry, instrument calibration, catalysis, operation technology, corrosion, high pressure, radiochemistry, hydrotechnology, and alumina. The Central Laboratorium for Sulfur Ore and Chemical Minerals (Kenerc es Vegyipari Asvanyianyagok Kozponti Laboratoriuma) (/Polish/: Centralne Laboratorium Siarki i Kopalin Chemicznych; Director: A. Pfeffer) is located at the same premises. In the departments of metal processing, sulfur refinery and salt refinery, their studies involve besides sulfur ores, also the processing of barites, common salt, and potassium salts.

In Gliwice I visited the Institute of Inorganic Chemistry (Szervetlen Vegyipari Intezetet) (/Polish/: Insytut Chemii Nieorganicsnej; Director: Jan Wirowski). It has a staff of 220 in its numerous departments, and a well-equipped large hall for experiments. The main field of study is the technology of salts (P, F, Ba, Cr, K salts and NaCl) but there are at the same time special sections for the study of analytics, corrosion, operations, and semi-conductors.

I have also visited the Institute of Dyes and Lacquers in Gliwice (Festek- es Lakkipari Intezetet) (/Polish/: Instytut Farb i Lakierow; Director: Prof. Ludwik Chromy) working with a staff of 120. The new building of this institute is under construction. In its various departments synthetic resins, anticorrosive dyes, pigments, insulating lacquers, and emulsion dyes are produced and investigated. There is also a special physical laboratory.

/Bibliography here omitted./

10,810
CSO: 2000-S

VISIT TO EAST GERMAN ISOTOPE, ELECTROCHEMICAL, PHYSICAL CHEMISTRY AND NUCLEAR PHYSICS RESEARCH INSTITUTE

/Following is a translation of an article by Tivadar Palagyi, Hungarian Academy of Sciences, Central Research Institute for Chemistry, Budapest, in the Hungarian-language periodical A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei (Bulletin of the Chemical Sciences Section of the Hungarian Academy of Sciences), Vol 19, No 3, Budapest, 1963, pages 387-388./

In the course of my three-week-long trip made in the fall of 1962, I visited the institutes and laboratories in Berlin and Dresden, for the chemical and physico-chemical investigations of radioactive isotopes with special regard to their employment in the examination of boundary surface phenomena and the technique of their measuring. The following report is a comprehensive survey of what I have seen and learned because if is my hope that it will be useful in the arrangement of future study trips and it may also give helpful information to those who will be delegated to such trips.

In Berlin, I visited the Institute for Isotope Distributinn in Buch (Izotopeloszto Intezetet) (/German/: Isotopenverteilungsstelle, Berlin-Buch). The finishing and shipping of all the radioactive materials produced in the GDR /German Democratic Republic/ are done by this institute. There is a separate section which produces sealed radioactive preparations. The decontamination of radioactive refuse water is done in a separate building where equipment with a holding capacity of 25,000 liters is housed. In stone containers the radioactive pollution is removed by precipitating the solutions. After filtering, the pulpy precipitate is pumped into metal containers to be buried.

In Berlin-Buch I have also visited the Institute of Isotope Research (Isotopkutato Intezetet) (/German/: Institut fuer Isotopenforschung) where, primarily for medical and biological purposes, research work is being carried on in the following three fields:

a) Protein synthesis with labelled compounds; b) animal experiments to investigate the absorption and elimination of isotopes; c) chemistry of radiation effects.

In Dresden, I visited those laboratories of the Institute for Electrochemistry and Physical Chemistry (Elektrokemiai es Fizikai-Kemiai Intezeteben) (/German/: Institut

fuer Elektrochemie und Physikalische Chemie) of the Technical University (Muszaki Egyetem) whose work was of interest for my own studies.

In the laboratory for fuel cells, H_2-O_2 cells with synthetic membranes are under investigation. They have succeeded in producing cells carrying charges of 4-5 milliamperes.

In the laboratory of galvanotechnique, hard gold plating and the process of black chrome plating with infrared rays are investigated, and the mechanism of electrotechnical degreasing examined by means of labelled hydrocarbons. Further, they study the possibilities of degreasing and deoxidation by basic salt solutes, the separation of aluminum in non-watery solutinns, the anodic behavior of titanium in the electrolysis of titanium salts and the methods to simplify the anodic solving of nickel.

Manifold activities are going on in the isotope laboratory. Examined are the anion absorption on metallic surfaces, the efficiency of degreasing substances with the aid of labelled glycerine palmitate, and the effect mechanism of ^{32}P-labelled phosphate steeps. Using triterium, they study the behavior of the passive layer produced by electric current on the surface of zinc foil. Of great industrial importance was the investigation by 300 millicurie ^{24}Na isotopes of the distribution of good and poor quality coal in a large briquette factory and the determination of their influence on the quality of the final product.

In the galvanic cell laboratory the relations between the activity and the self-discharge of brownstone /pyrolusite/ electrodes are being studied, as well as the influence of grain size and graphite addition on the capacitance and self-discharge of nickel hydroxide masses in basic batteries.

I have inspected the resonance spectrometer built in the Institute and the BET-method equipment for surface determinations.

The rest of my time was spent in the Central Institute of Nuclear Physics (Kozponti Magfizikai Intezetben) in Rossendorf (/German/: Zentralinstitut fuer Kernphysik) where I visited the radiochemistry department and inspected the cyclotron.

The analytic division of the radiochemistry department carries on activation analyses, spectroscopy and microanalysis, and polarographic investigations are made in connection with the reduction of plutonium salts to plutonium metal.

The department for isotope production works in cooperation with the reactor. ^{32}P- and ^{35}S-labelled compounds account for the main bulk in their production program.

The radiation chemistry department studies the catalytic effects of radioactive radiation, and with the aid of radioactive radiating substances imbedded into the material of the oxygen electrodes of fuel cells, the possibilities are studied for increased charging capacity and decreased polarization.

There is an independent division producing labelled organic compounds. The problems of decontamination of polluted refuse waters are studied by another independent division They investigate the possibilities of precipitation by ion-exchange resins, electrodyalisis and nuclear formation.

In addition, I also inspected the cyclotron of the Institute of Nuclear Physics (Magfizikai Intezet).

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VISIT TO IR-SPECTROSCOPY LABORATORY OF THE

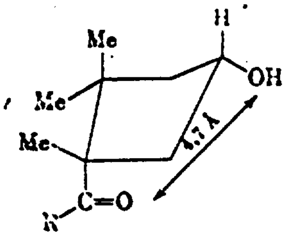
INSTITUTE OF CHEMISTRY, CZECH ACADEMY OF SCIENCES

/Following is a translation of an article by Jozsef Szabolcs, Medical University of Pecs, Department of Chemistry, in the Hungarian-language periodical A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei (Bulletin of the Chemical Sciences Section of the Hungarian Academy of Sciences), Vol 19, No 3, Budapest, 1963, pages 389-390./

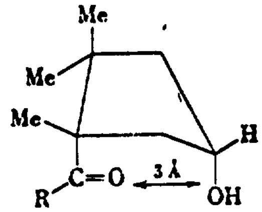
The purpose of my visit to the IR-spectroscopy laboratory of the Institute of Chemistry (Kemiai Intezetenek) of the Czechoslovak Academy of Sciences (Czehszlovak Tudomanyos Akademia) was to study the conditions of capsantin /kapszantin/ conformation and the isomeric conditions of the two capsantols /kapszantol/ produced by the lithium aluminum hydride reduction of capsantin.

1. In the pentacyclic ring of capsantin, the chromophoric group starting with the carbonyl group and the hyroxyl group are all in the cis position. It is easy to conclude therefore that a hydrogen bond is created between the carbonyl and hyrdroxyl groups. This hydrogen bond can be well reproduced on a Stuart-Briegleb model. Further, it has been an established observation that the peaks of the ultraviolet spectrum of capsanton /kapszanton/ are removed by one or two millimicons as compared to the peaks of capsantin. It appeared advisable, therefore, to examine capsantin by infrared spectroscopy.

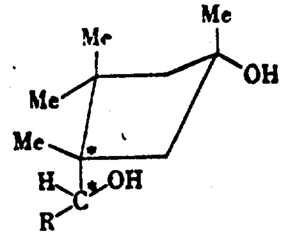
According to the measurings by J. Pitha--although he later repeated them using a cooled phial /kuvetta/ --there is no hydrogen bond in the capsantin molecule. Thus, taking the two possibilities of conformation, the pentacyclic ring probably assumes the position I in which the cis groups of carbonyl and hydroxyl are at a distance of approximately 4.7 Å /Augstrons/. A hydrogen bond, namely, is only possible in position II where the distance between the two groups is 3 Å.



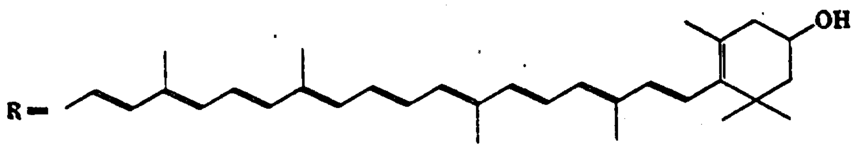
I



II



III



It is known that a cyclopentane ring is deformed and takes on the shape of an open envelope most probably due to the eclipsed interaction between the hydrogens. According to our theory, one of its positions in capsantin is stabilized by interaction between the three neighboring methyl groups and the long chromophore. Based on known analogies, similar conformations are assumed in cryptocapsin /kriptokapszin/ and in capsoruby /kapszorubin/.

2. In the lithium aluminum hydride reduction of capsantin two capsantols (III) of deviating physical constants are produced whose ultraviolet-spectra, however, are identical; none has a cis-peak. The IR-spectra of these two capsantols, however, are not identical; missing in both is the deformation oscillation line at 1380 centimeter $^{-1}$ which is a characteristic of the cis carotenoids. Since the possibility of a cis-trans isomerism along the pentacyclic ring has already been eliminated by previous experiments, isomerism is either caused by the erythro-treo /eritro-treo/ relation of the two capsantols, or even by atropisomerism. (There are steric restrictions along the linkage of the carbon atom in the carbonyl group to the pentacyclic ring.) The question remains to be solved here in Hungary by racemization experiments.

The organization and instrumental equipment of the host institute under the directorate of Professor F. Sorm has recently been described in all detail by Ferenc Dutka /See Note/; therefore no special mention of it is being made here.

(/Note/: See A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei (Bulletin of the Chemical

Sciences Section of the Hungarian Academy of Sciences), Vol 10, 1962, page 499.)

I have also visited the Research Institute for Synthetic Materials (Muanyagipari Kutato Intezetben) (Head: Professor Wichterle). The institute has excellent instrument equipment: beginning with the Japanese electron microscope model JEM-6A, or the equally Japanese JNM-3 nuclear magnetic resonance spectrometer, they have practically every possible instrument. The organization of the institute is quite remarkable. The specialty distribution of their graduate research workers, for example, is as follows: approximately 60% are organic chemists, 30% physico-chemists and 10% theoretical physicists. Even their new building is an experiment. It has panel construction and, with regard to explosion hazards, special construction methods were applied. The institute subscribes to some 200 periodicals.

In the Institute of Physical Chemistry (Fizikai Kemiai Intezetben) of the Academy, I visited the laboratory for mass spectrometry, and in the Institute for Pharmaceutical and Biochemical Research (Gyogyszer es Biokemiai Kutato Intezetben) the department of paper chromatography (K. Macek).

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VISIT TO POLISH CHEMICAL AND MACHINERY INSTITUTES

/Following is a translation of an article by Lorinc Barhegyi, Aspirant, Technical University of Budapest, Department of Chemical Operations and Machinery, in the Hungarian-language periodical A Magyar Tudomanyos Akademia Kemiai Tudomanyok Osztalyanak Kozlemenyei (Bulletin of the Chemical Sciences Section of the Hungarian Academy of Sciences), Vol 19, No 3, Budapest, 1963, pages 391-392./

During the three weeks spent in Poland, I visited the following institutions:

1. Polish Academy of Sciences (Lengyel Tudomanyos Akademia), Institute of Chemical Operations and Machinery (Vegyipari Muveletek es Gepek Intezetet), directed by Professor Dr. Tadeusz Hobler (Gliwice).

2. Technical University of Gliwice (Gliwicei Muszaki Egyeten) (Silesian School of Politechnics (Szileziai Politechnika), Department of Chemical Operations and Machinery (Vegyipari Muveletek es Gepek Tanszeket).

3. Research Institute for Inorganic Chemistry (Szervetlen Kemiai Kutato Intezet), Division of Chemical Operations (Vegyipari Muveletek Osztalyat) (Gliwice).

4. Research Institute for Refractory Materials (Tuzallo anyagok Kutatointezetet) and the Factory for Unit and Small Series Production of Refractory Materials (Tuzallo Anyagok Egyedi es Kissorozat gyarto uzemet) (Gliwice).

5. University departments for instrumentation and automation (Technical University of Gliwice).

In the Academy's Institute of Chemical Operations and at the University Department of Chemical Operations, I studied those sections of their research program which are in close connection with my aspirancy thesis, i.e., the instruments and tools used for the new type (turbogrid) plate structures. Both of these institutes carry on extensive research work in heat exchange and thermodynamics. A theme of primary importance is the determination of the coefficient of heat passage in pipe systems and the examination of surface tension in wetted pipe surfaces.

In the Division of Chemical Operations of the Research Institute for Inorganic Chemistry, experiments with filtration, drying, and crushing are carried on in their well-equipped

pilot plant. Their theme of prime importance is the filtration of the salts of phosphoric acid. At present, they are working on the technology of a new plant for synthetic detergents.

In the Institute of Refractory Materials I again studied the operations of filtration, drying, and crushing. I have inspected in their laboratory the instrumental measurings (ultrasonic, x-ray, spectrometric, etc.) I was surprised not to find any Hungarian instruments in these well-equipped laboratories. When asked, they have put the blame on the fact that no catalogs or price lists have been made available to them of the otherwise very appropriate Hungarian instruments exhibited at the various trade fairs.

From among the university departments visited, special mention must be made of the Department of Measuring and Calibrating Technics (Meres- es Szabalyozastechnikai Tanszek). In their excellently furnished laboratory the instruction of automation is well established.

Instruction in general is well organized. In the hall for operations and energetics now under construction, pilot plant instruction will be cooperatively organized by the university departments for their respective specialties.

The institutional organization of postgraduate instruction of automation for engineers deserves special attention. The number of attendants at these evening courses is gradually decreasing. Due to the elasticity of their instruction program and, in part, to its novel character (the University was established in 1945), they have no problems in regard to reforms in their instruction methods.

- END -

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